Wilderness Medicine Lab
MSU Emergency Medicine Residency

Splinting Lab
April 23rd, 2013

Treatment of Fractures and Dislocations

- Immobilize the injury.
  - Bones above and below dislocations.
  - Joints above and below fractures.
- Clean and dress wounds.
- Remove jewelry, watches, and tight clothing.
- Rest, ice, compression, and elevation (RICE) therapy.
- Assess circulation, temperature, and sensation before and after splinting.
- Assess for other injuries.
- Treat for shock.
Improvised cervical collars

1. Take a jacket.
2. Roll it up to the desired length.
3. Place the roll under the patient's neck.
4. Secure with a strap or bandage.

Realignment and traction

1. Apply gentle traction to realign the spine.
2. Apply a splint to stabilize the cervical spine.
3. Use a cervical collar for additional support.
4. Monitor the patient's vital signs throughout the process.
MAKING AN IMPROVISED TRACTION SPLINT

1. Wrap a cravat or strip of cloth loosely around the upper thigh.

2. Tie around the end of a stout stick. Stick should be forked and extend 12”-18” past the foot.

3. The improvised traction splint in place and functioning—see traction detail below.

4. Wrap the entire leg with a 6” ACE bandage—do not wrap so tight as to impede circulation.

Traction Detail
Foot is wrapped (see detail below) and attached to stick with a hitch that places the entire system under light tension.

3A. Put under about 10 lbs tension and tie off.

3B. This hitch is a useful alternative to the sprained ankle hitch.

Foot-Wrap Detail
The sprained ankle hitch is the standard tie-off method, creating a strong and stable point from which to pull traction—see the S-Hitch alternative to the right

It is important to maintain manual traction throughout the process.

S-Hitch Detail
This hitch is a useful alternative to the sprained ankle hitch.

1. 2
Traction Splints in Wilderness Medicine

Under the right conditions, we have no particular problem with traction splints for femur fractures. They can make moving an injured person easier and less painful. But there are a number of issues related to prolonged application of improvised devices and their infrequent practice and use that concern us. Let me try to summarize them.

1. There is no convincing medical evidence that traction splints provide consistent benefit for comfort or long term outcome. Our instructors, with decades of work experience as paramedics, nurses and physicians confirm this. Even when properly applied, sometimes traction splints decrease pain, sometimes worsen it and sometimes have no effect at all.

2. There are claims about the value of a traction splint that have not been demonstrated clinically or in the medical literature. They do not consistently realign bones. I believe that the optimal tension (often given as 1 lb /0.45 kg for every 10 lbs/4.5 kg body weight or mass to a maximum of 15 lbs/7 kg) is based on minimizing skin ischemia and not necessarily for the correct amount for bone stability or alignment. Otherwise, the amount of suggested tension ought to increase as the amount of thigh muscle mass and spasm go up. Also, the theory that traction decreases the potential space where bleeding can occur seems fanciful at best.

3. Skilled practitioners have a difficult time gauging the right tension unless a strain gauge is part of the device (e.g., Sager). Too much increases the risk of ischemia. Not enough may limit theoretical bone fragment stability, potentially resulting in more pain and more deep tissue and neurovascular injury.

4. It has been demonstrated that the tension of a properly applied commercial splint decreases significantly within a half hour. What do you think happens with an improvised splint? If efficacy is a function of tension and you cannot measure it, how will you know if it has loosened up and by how much?

5. Traction splints can cause complications and ischemia can occur at the proximal (groin or ischial tuberosity/sitz bone) and distal (ankle) anchor points because of direct and circumferential pressure under tension. Foot numbness and/ or diminished foot pulses frequently develop after commercial traction splints are applied properly in urban EMS. What do you think would happen after 6, 12 or 24 hours? Foot ischemia and tissue infarction have been reported after prolonged use. Other complications like permanent nerve palsies and compartment syndrome have also been documented.

6. It is difficult to reassess neurovascular function and comfort in patients who are no longer awake and only responding to verbal stimulus or worse. The issue is compounded with someone with a boot on and/or who is hypothermia packaged.

7. Even well-trained professional EMS practitioners use commercial traction splints when they are either contraindicated or not needed.

8. Traction splints can take up a lot of room. Many airmedical services still use helicopters that cannot transport patients fitted with the most commonly used commercial traction splints. The same would be true for almost every improvised traction splint that I have ever seen. Likewise, it can be difficult to fit a tall person with any traction splint into a litter.

9. Except perhaps for ski patrol, fractured femurs are relatively uncommon injuries. NOLS has done a good job of monitoring incidents in the field on their programs. Ask them how many fractured femurs they have had to manage. Hint: Rarely.

10. Outside of North America, traction splints are infrequently used because there are better or at least comparable alternatives that are safer and easier to use. Skiers in W Europe and in an increasing number of
places in North America use vacuum mattresses. These are effective and much more comfortable. They are also excellent for patient/spine protection. When a vacuum mattress is not available, we package femurs by incorporating solid, buddy splint padding within the carrying systems.

11. Under conditions where a traction device may be indicated and acceptable, improvised splints are not a suitable alternative. They will perform less well than a manufactured variety. The effectiveness of any is dependent on available materials and creativity. I suspect there a few Wilderness First Responder students who will do a really fine job. On the whole, however, most will not be able to make a passable one after less than 6 months from their course.

It was not a simple matter to remove improvised traction splints from our curriculum. Students had fun and on occasion we were impressed with their ingenuity. In the end, however, it was hard to justify spending an hour on a skill that would be infrequently used with a device that is of questionable value. Management of femur injuries are covered during splinting on our courses and we include vacuum mattresses on our specialized courses. More of our instructors are buying them for use on their courses.

**Bottom line:** Femur fractures are serious injuries that usually occur as the result of significant forces. A full assessment, focusing on critical system problems and their stabilization is the crucial first step.

Effective stabilization of femur injuries will help alleviate pain and decrease the possibility of complications. I believe that either a vacuum splint or good padding in a stable carrying device does a good job of providing both.

Although there is no literature supporting their efficacy in the prehospital setting, a commercial traction splint can be a useful tool when applied by a skilled practitioner who receives periodic training on a particular device and/or uses it during rescues or EMS calls. They should not be left on for a prolonged period of time (e.g., greater than 2 hours) unless limb neurovascular integrity and splint tension can be monitored properly and regularly.

Regardless, these are painful injuries. All require the administration of analgesics.

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This entry was posted in Curriculum, In Dr Johnson's opinion and tagged curriculum, femur fracture, traction splints, wilderness medicine. Bookmark the permalink.

One Response to *Tractions Splints in Wilderness Medicine*

**bill aughton** says:
April 11, 2012 at 10:56 am

I think if you look at the history of when traction splints were first used extensively in the first world war there was a significant decrease in mortality from femur fractures when they were applied.

The time factor is a point for discussion.

I would certainly want one used on me if I broke my femur. They are easy to improvise and monitor with a conscious patient. The neurological issues are clearly a problem with an unconscious patient.

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